

an antenna positioned at a distal end of the tool and configured to be selectively positioned within a mouth of a patient adjacent at least one exterior surface of a tooth; and

a waveguide connected to the antenna;

a source of microwave energy operably coupled to the waveguide, including a control system for controlling delivery of microwave energy to the waveguide such that the dental tool delivers microwave energy to the at least one exterior surface of the tooth and the microwave energy is applied at a frequency and power to preferentially heat caries.

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2. The microwave dental system of claim 1 wherein the control system controls the source of microwave energy to deliver less than 10 W to the antenna.
3. The system of claim 1 wherein the control system operates the source of microwave energy at voltages in a range of between 10 and 65 V.
4. The system of claim 1 wherein the control system operates the source of microwave energy at frequencies of between 1 GHz to 50 GHz.
5. The system of claim 4 wherein the control system operates the source of microwave energy at frequencies between 14 GHz to 24 GHz.

6. The system of claim 1 wherein the control system includes a feedback sensor and the microwave energy is applied to allow the feedback sensor to detect caries.

13. The system of claim 1 wherein the antenna further includes an antenna choke made of microwave absorbing materials.

14. A microwave dental system comprising:

a hand-held dental tool including:

an antenna positioned at a distal end of the tool and configured to be selectively positioned within a mouth of a patient adjacent at least one tooth; and

a waveguide connected to the antenna;

a source of microwave energy operably coupled to the waveguide, including a control system for controlling delivery of microwave energy to the waveguide such that less than 10 W of microwave energy is delivered to the antenna at frequencies between 1 GHz to 50 GHz.

16. A microwave dental system comprising:

a hand-held dental tool including:

an antenna positioned at a distal end of the tool and configured to be selectively positioned within a mouth of a patient adjacent at least one